# LEPHROVIVO CLUSTER

# PHYSICAL SCIENCES

## TERM 1: MARCH 2020

## GRADE : 12

## PAPER 2(CHEMISTRY)

**SCHOOL:**

| | |
|---|---|
| **LEANER NAME** | |
| **EDUCATOR** | |

**TIME: 1 HOUR** **MARK: 50**

| TOPIC | Mutlipe choice | IUPAC naming | Physical properties & IMF | Organic molecule reactions & polymers | | | Total |
|---|---|---|---|---|---|---|---|
| **Question** | 1 | 2 | 3 | 4 | 5 | | |
| **Maximum mark** | **8** | **20** | **8** | **14** | | | **50** |
| **Learner Mark** | | | | | | | |
| **Moderator's mark** | | | | | | | |

**This question paper consists of 11 pages including 2 formulae sheets**

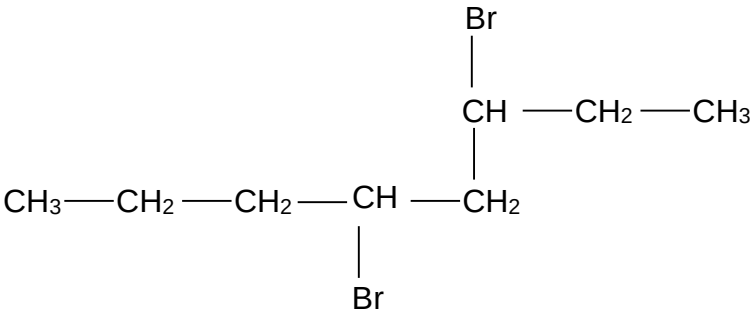
INSTRUCTIONS AND INFORMATION

1. This question paper consists of FOUR questions. Answer ALL the questions in the ANSWER BOOK.
2. Start EACH question on a NEW page in the ANSWER BOOK.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Leave ONE line between two sub questions, for example between QUESTION 2.1 and QUESTION 2.2.
5. You may use a non-programmable calculator.
6. You are advised to use the attached PERIODIC TABLE and information sheets.
7. Round off your final numerical answers to a minimum of TWO decimal places.
8. Give brief motivations, discussions et cetera where required.
9. Write neatly and legibly.

## QUESTION 1: MULTIPLE CHOICE QUESTIONS

Various options are provided as possible answers to the following questions. Write down the question number (1.1–1.4), choose the answer and write the answer (A–D) in the ANSWER BOOK.

1.1. The condensed structural formula of an organic compound is shown below:




Which ONE of the following is the correct IUPAC name of this compound?

A 4,6-dibromooctane

B 4-bromo-5-bromo-5-propylpentane

C 3,5-dibromooctane

D 2-bromo-1-bromo-1-propylpentane (2)

1.2 The temperature at which the solid and liquid phases of a substance are at equilibrium is known as the …

A. Boiling point.

B. Melting point.

C. Change in enthalpy.

D. Standard temperature. (2)

1.3 Consider the reaction represented below:

$$C_{12}H_{26} \rightarrow 2C_4H_{10} + C_2H_6$$

The term that **best** describes this reaction is:

A cracking.

B. addition.

C. elimination.

D. polymerisation (2)

1.4 A polymer formed because of addition polymerisation is most likely to be derived from a monomer that is …

A a carboxylic acid

B Saturated hydrocarbon

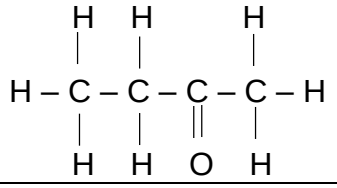
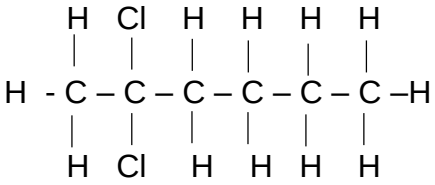
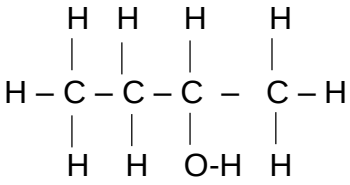
C an alcohol

D Unsaturated (2)

**[8]**

**QUESTION 2 (Start on a new page)**

Study the organic compounds represented by the letters A to G in the table below.

| | | | |
|---|---|---|---|
| A | $CH_3CH_2COOCH_2CH_3$ | B |  |
| C |  | D | Pentanoic acid |
| E | $CH_3CH_2C(CH_3)_2CH_2CH(CH_3)_2$ | F | $CH_3CH_2CHCH_2$ |
| G |  | | |

2.1 Write down the LETTER(S) that represent(s) each of the following:

(A compound may be used more than once)

2.1.1 An alkyl halide. (1)

2.1.2 A compound containing a carboxyl group. (1)

2.1.3 An ester. (1)

2.1.4 Two compounds that are functional isomers. (2)

2.1.5 A ketone. (1)

2.2 Write down the:

2.2.1 Structural formula of compound E. (2)

2.2.2 IUPAC name of compound E. (2)

2.3 Compound G is formed from compound F.

2.3.1 Name the type of reaction that produced compound G. (1)

2.3.2 Give the formula of another compound that is needed to form compound G from compound F. (1)

2.4 Give the IUPAC names of two compounds that will react to form compound A. (2)

2.5 Define the term *positional isomer.* (2)

2.6 For Compound G, write down the *positional isomer* and also give the IUPAC name for the compound. (3)

2.7 Name of the homologous series to which compound F belongs. (1)

**[20]**

**QUESTION 3 (Start on a new page)**

The table below shows the boiling points of four organic compounds, represented by the letters A to D, of comparable molecular mass. The boiling point of compound D is unknown.

| **COMPOUND** | | **MOLECULAR MASS ($g \cdot mol^{-1}$)** | **BOILING POINT ($^{O}C$)** |
|---|---|---|---|
| **A** | Pentan-1-ol | 88 | 138 |
| **B** | 2-methylbutan-1-ol | 88 | 127,5 |
| **C** | 2,2-dimethylpropan-1-ol | 88 | 52,5 |
| **D** | Pentanoic acid | 102 | X |

3.1 Define the term *boiling point*. (2)

3.2 Alcohols A, B and C are structural isomers.

3.2.1 Is compound C a PRIMARY, SECONDARY or TERTIARY alcohol? Give a reason for your answer. (2)

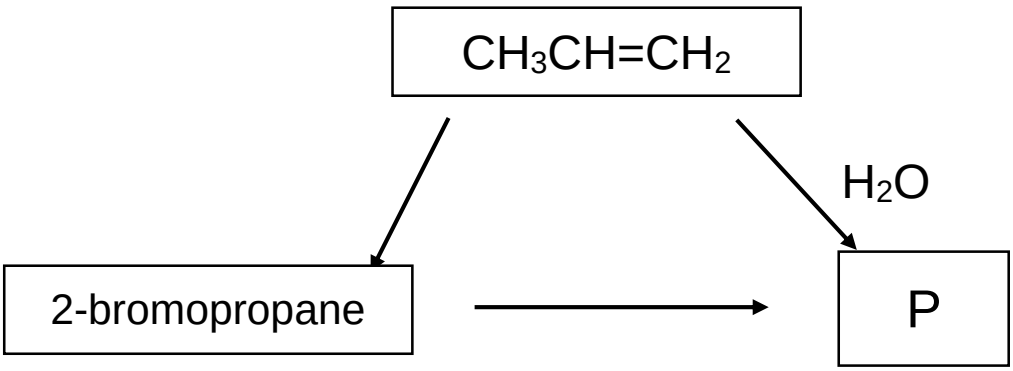
3.2.2 Fully explain why the boiling point decreases from A to C. (3)

3.2.3 Which compound (A or C) will have the highest vapour pressure?

**[8]**

**QUESTION 4 (Start on a new page)**

The flow diagram below shows the preparation of two organic compounds, using propene as one of the reactants.




4.1 Compound P can also be obtained from 2-bromopropane.

4.1.1 Is 2-bromobutane a PRIMARY, SECONDARY or TERTIARY alkyl halide? Give a reason for your answer. (2)

4.1.2 Name the type of reaction that converts 2-bromopropane to P. (1)

4.1.3 Using structural formulae only, write a balanced equation for the reaction in QUESTION 4.1.2. (3)

4.1.4 Indicate TWO reaction conditions for this chemical reaction. (2)

4.2 Polymers are large molecules consisting of repeating monomer units.

4.2.1 What is a *condensation polymer*? (2)

4.2.2 Write down the structural formula for the monomer from which polyvinyl chloride is derived. (2)

4.2.3 Give the name of the monomer. (2)

**[14]**

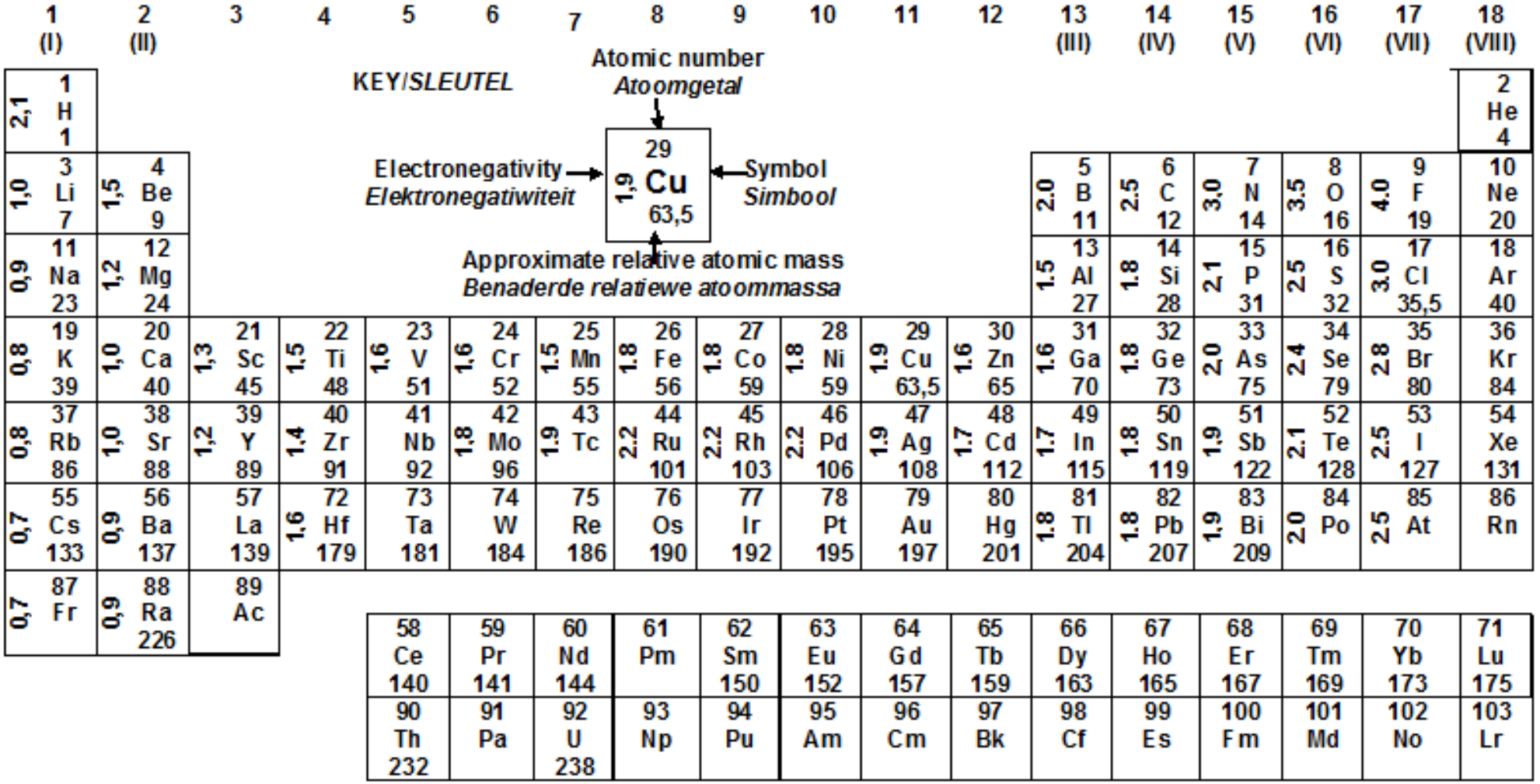
**GRAND TOTAL = 50**

**DATA FOR PHYSICAL SCIENCES GRADE 12**
**PAPER 2 (CHEMISTRY)**
**TABLE 1: PHYSICAL CONSTANTS**

| NAME | SYMBOL | VALUE |
|---|---|---|
| Avogadro's constant | $N_A$ | $6{,}02 \times 10^{23}$ mol$^{-1}$ |
| Standard pressure | $p^\theta$ | $1{,}013 \times 10^5$ Pa |
| Molar gas volume at STP | $V_m$ | 22,4 dm$^3$·mol$^{-1}$ |
| Standard temperature | $T^\theta$ | 273 K |

**TABLE 2: FORMULAE**

| | |
|---|---|
| $n = \frac{m}{M}$ | $n = \frac{N}{N_A}$ |
| $n = \frac{V}{V_m}$ | $c = \frac{n}{V}$ OR $c = \frac{m}{MV}$ |
| $\frac{C_a V_a}{C_b V_b} = \frac{n_a}{n_b}$ | $pH = -\log[H_3O^+]$ |
| $K_w = [H_3O^+][OH^-] = 1 \times 10^{-14}$ at 298 K | |




| 1 (I) | 2 (II) | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 (III) | 14 (IV) | 15 (V) | 16 (VI) | 17 (VII) | 18 (VIII) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,1 H 1 | | | | | | | | | | | | | | | | | 2 He 4 |
| 1,0 Li 7 | 1,5 Be 9 | | | | | | | | | | | 2.0 B 11 | 2.5 C 12 | 3,0 N 14 | 3.5 O 16 | 4.0 F 19 | 10 Ne 20 |
| 0,9 Na 23 | 1,2 Mg 24 | | | | | | | | | | | 1.5 Al 27 | 1.8 Si 28 | 2.1 P 31 | 2.5 S 32 | 3.0 Cl 35,5 | 18 Ar 40 |
| 0,8 K 39 | 1,0 Ca 40 | 1,3 Sc 45 | 1.5 Ti 48 | 1,6 V 51 | 1,6 Cr 52 | 1.5 Mn 55 | 1.8 Fe 56 | 1.8 Co 59 | 1.8 Ni 59 | 1.9 Cu 63,5 | 1.6 Zn 65 | 1.6 Ga 70 | 1.8 Ge 73 | 2.0 As 75 | 2.4 Se 79 | 2.8 Br 80 | 36 Kr 84 |
| 0,8 Rb 86 | 1,0 Sr 88 | 1,2 Y 89 | 1.4 Zr 91 | 41 Nb 92 | 1.8 Mo 96 | 1.9 Tc | 2.2 Ru 101 | 2.2 Rh 103 | 2.2 Pd 106 | 1.9 Ag 108 | 1.7 Cd 112 | 1.7 In 115 | 1.8 Sn 119 | 1.9 Sb 122 | 2.1 Te 128 | 2.5 I 127 | 54 Xe 131 |
| 0,7 55 Cs 133 | 0,9 56 Ba 137 | 57 La 139 | 1.6 72 Hf 179 | 73 Ta 181 | 74 W 184 | 75 Re 186 | 76 Os 190 | 77 Ir 192 | 78 Pt 195 | 79 Au 197 | 80 Hg 201 | 1.8 81 Tl 204 | 1.8 82 Pb 207 | 1.9 83 Bi 209 | 2.0 84 Po | 2.5 85 At | 86 Rn |
| 0,7 87 Fr | 0,9 88 Ra 226 | 89 Ac | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 58 Ce 140 | 59 Pr 141 | 60 Nd 144 | 61 Pm | 62 Sm 150 | 63 Eu 152 | 64 Gd 157 | 65 Tb 159 | 66 Dy 163 | 67 Ho 165 | 68 Er 167 | 69 Tm 169 | 70 Yb 173 | 71 Lu 175 |
| 90 Th 232 | 91 Pa | 92 U 238 | 93 Np | 94 Pu | 95 Am | 96 Cm | 97 Bk | 98 Cf | 99 Es | 100 Fm | 101 Md | 102 No | 103 Lr |